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(54) IMPROVEMENTS IN OR RELATING TO LIQUID CONTAINERS

(71) We, KODAK LIMITED, a Company registered under the law of England, of Kodak Houst, Station Road, Hemel Hempstead, Hertfordshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a container particularly but not exclusively for use in a processing apparatus and more particularly to a cover therefor.

In processing machines it is known to use fixed covers or floating covers for tanks containing processing fluids to minimise aerial oxidation of the processing fluid and to minimise splashing.

A fixed cover confers a number of advantages over a floating cover, as discussed, described and claimed in our copending Applications Nos. 57080/72 (Serial No. 1,454,994) and 57081/72 (Serial No. 1,443,939), but difficulties can arise where the processing fluid is maintained at a relatively high temperature during processing, but is allowed to cool during non-working periods, for example, at week-ends. When such cooling occurs the processing fluid contracts and the amount of such contraction may nullify the advantages of the fixed cover, by causing an excessive fall in level of the processing fluid.

Floating lids do not have this particular disadvantage but, on the other hand, problems are caused by the variable height of the cover relative to fixed infeed rollers or the like.

It is an object of the present invention to provide a container having a cover which avoids or minimises the aforesaid disadvantages.

According to the present invention there is provided a container for receiving a liquid and having a cover such as, in use, to float in the liquid, and stops on the container for limiting the upward movement of the cover when displaced by the liquid.

There is also provided, according to the present invention, a processing apparatus comprising a container as aforesaid.

The present invention will be described further, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is a vertical cross-section of one form of container according to the present invention, in the operative condition.

Fig. 2 is a view of the container of Fig. 1, in the inoperative condition.

Fig. 3 is a vertical cross-section of a further form of container according to the present invention, in the operative condition.

Referring to Figs. 1 and 2, a container 1 is arranged for receiving a processing liquid 2, and has a cover 3 able to float in the liquid 2. The cover 3 has apertures 4 and 5 extending through the thickness thereof. Screws 6 forming adjustable stops are fixed in lugs 7 attached to the side walls 8 and 9 of the container 1, the points of the screws defining an upper level 10 at which the cover 3 may float.

In use, the volume of the liquid 2 expands with increasing temperature, so that the upper surface 13 of the cover 3 contacts the screws 6. The liquid 2 then rises, in the apertures 4 and 5, thus contacting the level sensing element 18, to an upper level 11. Further entry and exit apertures (not shown) are at a predetermined level relative to, for example, fixed in-feed rollers of the processing apparatus. When the processing apparatus is switched off for a lengthy period, for example, at a weekend, the liquid 2 will cool and consequently contract. The level of the liquid 2 will then fall to such a level as 14 in Fig. 2, where the upper surface 13 of the cover 3 has fallen from contact with the screws 6, and the liquid in the apertures 4 and 5 has also fallen to the level 14.

In consequence the lower surface 12 of the cover 3 remains in contact with the upper surface of the liquid 2, protecting the liquid 2 from aerial oxidation, whether the

cover 3 is operating as a fixed cover in the upper position shown in Fig. 1, or as a floating cover in the lower position as shown in Fig. 2.

- 5 The level sensing element 18 will operate to replenish the level of liquid 2 in the container 1, when the liquid 2 falls below the level 11, but obviously means must be provided to prevent replenishment when the low level is due to thermal contraction and not due to loss of liquid mass from the container 1. This means may be provided by overriding the sensing element 18 by a thermal switch (not shown) or by the switching off of an electrical supply inhibiting replenishment.

- In many cases, it is advantageous to provide a space, clear of the liquid for various components of the processing apparatus, which however require to be in close proximity to the liquid. Such a space, reference 19, may be provided by an arrangement such as is shown in Fig. 3. Items having the same or similar functions to those of items shown in Figs. 1 and 2, have the same reference with the addition of a prime ¹. The space 19 is provided by extending the cover 3¹ downwardly as at 15 and 16, so that the space 19 is formed between the lower surface 12¹ of the cover 3¹ and the surface 17 of the liquid 2¹.

- Apertures 4, 5 in the cover 3 may be provided as necessary for the sensing of the level of the liquid 2, replenishment of the liquid 2, and ingress and egress of materials to be processed etc.

- It may be advantageous for only a portion of the cover 3 to float and not the whole cover 3 as shown in the figures.

WHAT WE CLAIM IS:—

1. A container for receiving a liquid and having a cover such as, in use, to float in the liquid, and stops on the container for limiting the upward movement of the cover when displaced by the liquid.
2. A container as claimed in Claim 1,

wherein the container, below the lower surface of the cover when in engagement with the stops, comprises a first chamber, for containing a major proportion of a predetermined volume of the liquid, in communication with at least one further chamber of reduced horizontal cross-sectional area and arranged to contain the remainder of said predetermined volume, said further chamber forming part of the cover, the first chamber presenting no surface to ambient atmosphere when liquid is contained by the container.

3. A container as claimed in Claim 2, wherein the or one of the further chambers has sensing means disposed therein for sensing the level of a surface of the liquid open to the ambient atmosphere.

4. A container as claimed in Claim 2 or 3, wherein the further chamber or chambers may be formed by the walls of an aperture or apertures respectively, extending through the cover.

5. A container as claimed in Claim 4, wherein the cover extends downwardly, whereby the liquid, in use does not contact the lower surface of the cover, and the aperture or apertures are in the extended portions.

6. A container as claimed in any preceding Claim wherein the stops are adjustable in a vertical direction.

7. A container as claimed in Claim 3 or any Claim appendant thereto, wherein the sensing means is arranged to cause replenishment of the received liquid, when the liquid is at a desired operating temperature and is less than the predetermined volume.

8. A container as claimed in Claim 1, substantially as hereinbefore described with reference to and as illustrated in Fig. 1, Fig. 2 or Fig. 3.

9. A processing apparatus comprising a container as claimed in any preceding Claim.

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FIG. 1

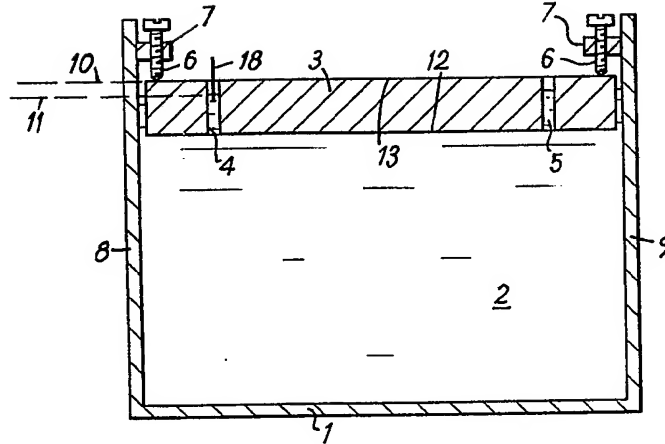


FIG. 2

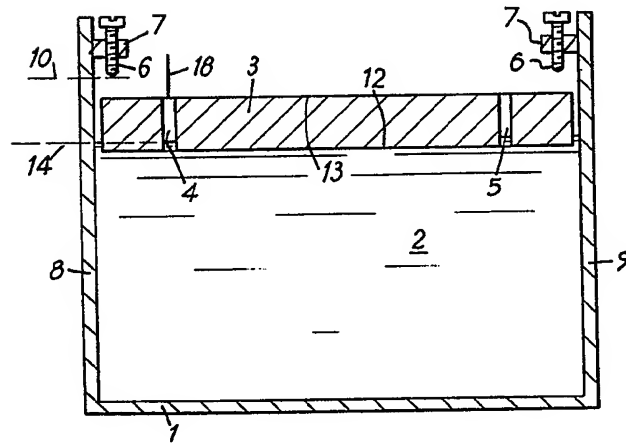


FIG. 3

